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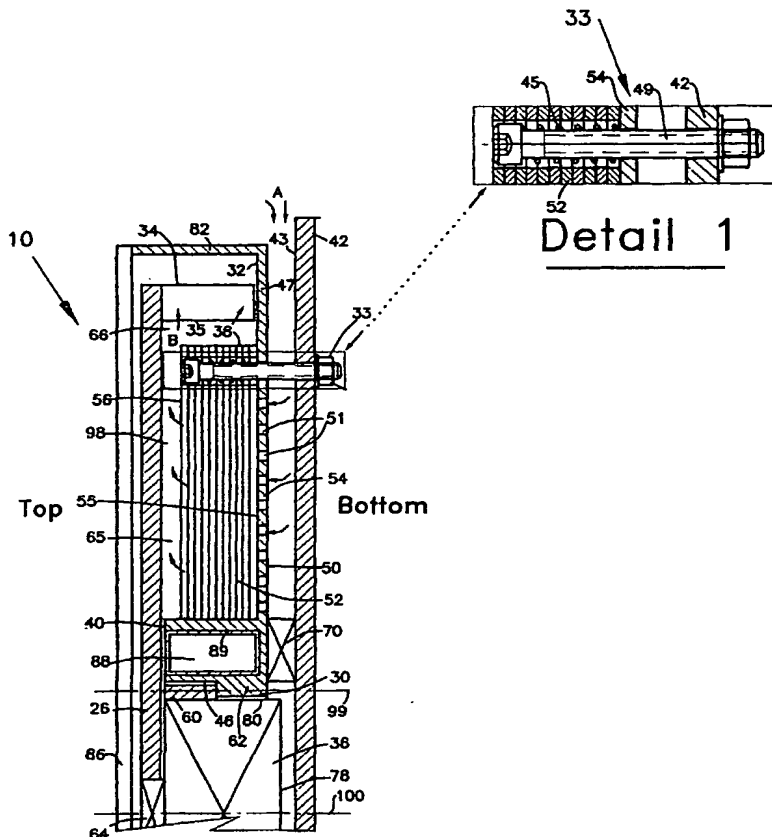
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[Continued on next page]

(54) Title: HEAT-SINK WITH LARGE FINS-TO-AIR CONTACT AREA



(57) Abstract: A cooling device for dissipating heat to the surrounding air from at least one heat-generating component mounted on a surface, the cooling device comprising: a heat-sink having a plurality of heat-conducting sections arranged in a low-profile configuration providing large surface-to-air contact area defined by high ratio of air-passage-area to the area of the heat-conducting-sections; wherein at least one of the heat-conducting sections is in thermal contact with the heat-generating component so as to facilitate thermal flow from the heat-generating component to the air via at least one of said heat-conducting sections; wherein the heat sink is adapted to operate with air-moving means, and wherein the cooling device and the air-moving means provide reduced thermal-flow resistance from the at least one of the heat-conducting sections in contact with the heat-generating component to the air, per specific volume occupied by the cooling device.



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL03/00066

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H05K 7/20

US CL : 165/80.3,121,122,185; 174/16.3; 257/722; 361/697,704

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 165/80.3,121,122,185; 174/16.3; 257/722; 361/697,704

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 5,365,400 A (ASHIWAKE et al) 15 November 1994 (15.11.1994), see Figures 1-5 and 12.	1-3,13-14,22,24,28-29,35-42,44,46 4-8,12,15,26,30-31,33-34,43,45
X --- Y	US 5,502,619 A (WANG) 26 March 1996 (26.03.1996) see Figure 1.	1-3,5,13-14,22,24,28-31,35-42,44,46 4,6-8,15,26,33-34,43
X --- Y	US 5,535,816 A (ISHIDA) 16 July 1996 (16.07.1996), see Figures 1-4 and 12.	1-3,13-14,22,24,26,28-29,35-42,44,46 4-8, 15,30-31,33-34,43,45



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

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INTERNATIONAL SEARCH REPORT

PCT/IL03/00066

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — Y	US 5,567,986 A (ISHIDA) 22 October 1996 (22.10.1996), see Figures 4-5 and 11.	1-3,13,22,24,28- 29,35-42,44,46 ----- 4-8,15,26,30-31,33- 34,43,45
X — Y	US 5,583,746 A (WANG) 10 December 1996 (10.12.1996), see all figures.	1-3,5,13-14,22,24, 28-31,35-42,44-46 ----- 4,6-8,15,2633-34,43
X — Y	US 5,896,917 A (LEMONT et al) 27 April 1999 (27.04.1999), see Figures 15-16 and 19-21.	1-4,13- 14,22,24,26,28-31,35- 42,44-46 ----- 5-8,15,33-34,43
X — Y	US 5,960,863 A (HUA) 05 October 1999 (05.10.1999), see Figures 3 and 7.	1-3,13-14,22,24,28- 31,35-42,44-46 ----- 4-8,15,26,33-34,43
X — Y	US 6,125,920 A (HERBERT) 03 October 2000 (03.10.2000), see Figures 3 and 7-8.	1-3,5,13-14,22,24,28- 31,35-42,44-46 ----- 4,6-8,15,26,33-34,43
X — Y	US 5,526,875 A (LIN) 18 June 1996 (18.06.1996), see Figures 1-7.	1-2,13-15,22,24,28- 31,35-42,44-46 ----- 3-4,26,43
Y	US 6,244,331 B1 (BUDELMAN) 12 June 2001 (12.06.2001), see Figures 4-5B.	33-34
Y	US 6,104,607 A (BEHL) 15 August 2000 (15.08.2000), see Figure 3, element 44.	43

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL03/00066

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-8, 12-15, 22, 24, 26, 28-31 and 33-46

Remark on Protest ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In order for more than one species to be examined, the appropriate additional examination fees must be paid. The species are as follows:

- I. Figures 1A-I
- II. Figure 2A
- III. Figures 3E-G
- IV. Figures 5A-J
- V. Figures 6A-C
- VI. Figures 11A-B

The claims are deemed to correspond to the species listed above in the following manner:

- I. Claims 3-8, 13-15, 22, 24, 26, 33-34, 41, 43
- II. Claims 3, 11, 13-15, 26, 32-34, 41, 43
- III. Claims 3-4, 9-10, 13-15, 26, 33-34, 41, 43
- IV. Claims 3, 16-17, 21
- V. Claims 18-21, 25, 27
- VI. Claims 3, 11, 41

If applicant believes more species exist, the applicant should list the figures and claims associated therewith.

The following claim(s) are believed to be generic: 1-2, 12, 28-31, 35-40, 42 and 44-46.

The species listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons: the species are mutually exclusive and are separately the special technical features. The subject matter of the generic claims are not special technical features.

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